

ing signal to clutch controller 100 to disengage clutch 44, thereby stopping power take-off 48 and pump 60.

At this point, the operator then closes hose valve 210 and disconnects it from connector 202 on storage tank 200.

If reel 22 is manually operated, the operator must manually rewind hose 24 on the reel. However, if reel 22 is powered by reel motor 152, the operator may once again push and hold remote reel button 180 on remote controller 170 to send a reel rewind signal to reel rewind controller 162 and reel motor 152 so that hose 24 is automatically rewound on reel 22. All the operator has to do at this point is "walk" hose 24 back toward delivery vehicle 10. To stop rewinding at any time, the operator simply releases remote reel button 180 on remote controller 170 to send a reel stop signal (an interruption or cessation of the reel rewinding signal) to hose reel controller 156 and reel motor 152 to stop the rotation of the reel motor.

It will be seen that control system 30 for liquid delivery vehicle 10 thus provides an easily used, remote control of the system, and requires only a single trip from delivery vehicle 10 to storage tank 200 and back for a complete filling operation. This is a great improvement over the prior art previously described in which three such round trips are necessary.

To minimize the possibilities of dangerous situations and to comply with the above-mentioned Department of Transportation regulations, remote controller 170 has remote shutdown button 178 therein which, when pushed, remotely shuts down control system 30 completely. When remote shutdown button 160 is pushed, an engine shutdown signal is sent to the ignition of engine 40 on vehicle 10 so that the engine is stopped, a valve closing signal is sent to internal flow valve controller 104 so that internal flow control valve 52 is closed, and a power take-off disengaging signal is sent to power take-off controller 102 so that power take-off 48 is disengaged. In this way, pump 60 is shut off, and no liquid may flow from delivery tank 20 because internal flow valve 52 is closed. Shutdown indicator light 142 on annunciator panel 36 is illuminated.

It will be seen, therefore, that the delivery vehicle with remote control system of the present invention is well adapted to carry out the ends and advantages mentioned, as well as those inherent therein. While a preferred embodiment of the apparatus and method of use are described for the purposes of this disclosure, numerous changes in the arrangement and construction of parts in the apparatus and steps in the method may be made by those skilled in the art. All such changes are encompassed within the scope and spirit of the appended claims.

What is claimed is:

1. A control apparatus for use on a liquid delivery vehicle of the type having a liquid tank, a flow valve in communication with the liquid tank, a pump in communication with the flow valve, a power take-off connected to the pump for providing power thereto, a clutch for selectively connecting the power take-off to an engine of the vehicle, said apparatus comprising:

clutch control means mounted on the vehicle for engaging the clutch in response to a clutch engaging signal and disengaging the clutch in response to a clutch disengaging signal;

valve control means mounted on the vehicle for opening the flow valve in response to a valve opening signal and closing the flow valve in response to a valve closing signal;

power take-off control means mounted on the vehicle for engaging the power take-off in response to a power

takeoff engaging signal and disengaging the power take-off in response to a power take-off disengaging signal; and

5 a remote control for selectively sending said clutch engaging and disengaging signals to said clutch control means.

2. The apparatus of claim 1 wherein said clutch control means comprises a clutch pneumatic controller connectable to an air source on the vehicle and responsive to said clutch 10 engaging and disengaging signals.

3. The apparatus of claim 2 wherein:

said clutch control means further comprises:  
a clutch pressure switch in pneumatic communication with said clutch pneumatic controller; and  
a clutch indicator light connected to said clutch pressure switch such that said clutch indicator light is illuminated when said clutch pressure switch senses air pressure applied to said clutch pneumatic controller.

20 4. The apparatus of claim 1 wherein said valve control means comprises a valve pneumatic controller connectable to an air source on the vehicle and responsive to said valve opening and closing signals.

5. The apparatus of claim 4 wherein:

said valve control means further comprises:  
a valve pressure switch in pneumatic communication with said valve pneumatic controller; and  
a valve indicator light connected to said valve pressure switch such that said valve indicator light is illuminated when said valve pressure switch senses air pressure communicated to said valve pneumatic controller.

35 6. The apparatus of claim 1 wherein said power take-off control means comprises a power take-off pneumatic controller connectable to an air source on the vehicle and responsive to said power take-off engaging and disengaging signals.

7. The apparatus of claim 1 wherein:

said clutch control means comprises:  
a clutch controller; and  
a clutch switch having a clutch engaging position for communicating said clutch engaging signal to said clutch controller and a clutch disengaging position for communicating said clutch disengaging signal to said clutch controller; and  
said remote control can transmit said clutch disengaging signal and said clutch engaging signal to said clutch controller when said clutch switch is in said clutch disengaging position.

8. The apparatus of claim 1 wherein:

said valve control means comprises:  
a valve controller; and  
a valve switch having a valve opening position for communicating said valve opening signal to said valve controller and a valve closing position for communicating said valve closing signal to said valve controller.

9. The apparatus of claim 1 wherein:

said power take-off control means comprises:  
a power take-off controller; and  
a power take-off switch having a power takeoff engaging position for communicating said power take-off engaging signal to said power take-off controller and a power take-off disengaging position for communicating said power take-off disengaging signal to said power take-off controller.

10. The apparatus of claim 1 further comprising throttle control means for opening an engine throttle of the vehicle in response to a throttle opening signal and closing the throttle in response to a throttle closing signal; and said remote control means being adapted for transmitting said throttle opening and closing signals.

11. The apparatus of claim 10 wherein said throttle control means comprises a throttle controller connectable to an electrical air source of the vehicle and responsive to said throttle opening and closing signals.

12. The apparatus of claim 10 wherein:

said throttle control means comprises:  
a throttle controller; and  
a throttle switch having a throttle opening and closing position; and  
said remote control can transmit said throttle opening and closing signals to said throttle controller when said throttle switch is in said throttle closing position.

13. The apparatus of claim 10 wherein:

the delivery vehicle is also of the type having a hose in communication with the flow valve and a reel for the hose; and

said remote control is also adapted for selectively sending a hose reel winding signal to the reel such that the reel rotates in a direction for winding the hose thereon when said clutch disengaging signal is communicated to said clutch control means and said throttle closing signal is communicated to said throttle control means, a hose reel unwinding signal such that the reel is rotated in a direction for unwinding the hose therefrom when said clutch disengaging signal is communicated to said clutch control means and said throttle opening signal is communicated to said throttle control means, and a hose reel stop signal to stop winding and unwinding of the reel.

14. The apparatus of claim 1 further comprising emergency shutdown means for substantially simultaneously shutting off the engine of the vehicle, closing the flow valve and disengaging the power take-off in response to a shutdown signal, wherein said remote control is adapted for transmitting said shutdown signal.

15. The apparatus of claim 14 wherein said shutdown signal comprises an engine stop signal, said valve closing signal and said power take-off disengaging signal.

16. The apparatus of claim 1 wherein:

the delivery vehicle is also of the type having a hose in communication with the flow valve and a reel for the hose; and

said remote control signal is also adapted for selectively sending a hose reel winding signal to the reel for winding the hose thereon, a hose reel unwinding signal for unwinding the hose therefrom and a hose reel stop signal to stop winding and unwinding of the reel.

17. The apparatus of claim 16 wherein:

the reel will only rotate in a winding direction when said clutch disengaging signal is sent to said clutch control means and said throttle closing signal is sent to said throttle control means; and

the hose will only rotate in an unwinding direction when said clutch disengaging signal is sent to said clutch control means and said throttle opening signal is sent to said throttle control means.

18. The apparatus of claim 17 wherein:

said clutch control means comprises:  
a pneumatic clutch controller connectable to an air source on the vehicle and responsive to said clutch engaging and disengaging signals; and

a clutch pressure switch in pneumatic communication with said clutch pneumatic controller and connected to the reel motor such that the reel motor will rotate only when said clutch pressure switch senses air pressure communicated to said clutch pneumatic controller.

19. A delivery vehicle for transporting liquid and delivering the liquid to a storage location, said vehicle comprising:

- 10 a rolling chassis having a plurality of wheels thereon including a plurality of drive wheels;  
an engine on said chassis;
- 15 a transmission connected to said engine and adapted for transmitting power from said engine to said drive wheels;
- 20 a cargo tank mounted on the chassis for holding a quantity of the liquid;
- 25 a flow valve in communication with the cargo tank;  
fluid transferring means having an inlet in communication with said flow valve and an outlet, for transferring liquid from said cargo tank;
- 30 a delivery hose in communication with said outlet of said fluid transferring means and having an end adapted for connection to the storage location;
- 35 a power take-off on said transmission and connected to said fluid transferring means, said power take-off having an engaged position wherein power from said engine is transferred to said fluid transferring means, and a disengaged position disengaged from said engine thereby preventing transfer of power from said engine to said fluid transferring means;
- 40 a transmission controller for engaging said transmission in response to a transmission engaging signal and disengaging said transmission in response to a transmission disengaging signal;
- 45 a valve controller for opening said flow valve in response to a valve opening signal and closing said valve in response to a valve closing signal;
- 50 a power take-off controller for engaging said power take-off in response to a power take-off engaging signal and disengaging said power take-off in response to a power take-off disengaging signal; and
- 55 a radio remote control for selectively transmitting said transmission engaging and disengaging signals.

20. The vehicle of claim 19 wherein:

said transmission is a manual transmission comprising a clutch;  
said transmission controller comprises a clutch controller;  
said transmission engaging signal is a clutch engaging signal sent to said clutch controller; and  
said transmission disengaging signal is a clutch disengaging signal sent to said clutch controller.

21. The apparatus of claim 20 wherein:

said clutch controller comprises a manual switch having clutch engaging and disengaging positions; and  
said remote control can transmit said clutch engaging and disengaging signals when said switch is in said clutch disengaging position.

22. The vehicle of claim 20 further comprising an air source;

wherein, said clutch controller is a pneumatic controller connected to said air source.

23. The vehicle of claim 22 further comprising:  
a clutch pressure switch in pneumatic communication with said clutch controller; and

a clutch indicator light connected to said clutch pressure switch such that said indicator light is illuminated when said clutch pressure switch senses air pressure communicated to said clutch controller.

24. The apparatus of claim 19 wherein:

said transmission is an automatic transmission; said transmission controller and said power take-off controller are combined as a single controller characterized by a solenoid connected to said automatic transmission; said transmission engaging signal and said power take-off engaging signal are combined as a single engaging signal communicated to said solenoid; and said transmission disengaging signal and said power take-off disengaging signal are combined as a single disengaging signal communicated to said solenoid.

25. The vehicle of claim 19 further comprising an air source;

wherein, said valve controller is a pneumatic controller connected to said air source.

26. The vehicle of claim 25, further comprising:

a valve pressure switch in pneumatic communication with said valve controller; and a valve indicator light connected to said valve pressure switch such that said valve indicator light is illuminated when said valve pressure switch senses air pressure communicated to said valve controller.

27. The vehicle of claim 19 further comprising an air source;

wherein, said power take-off controller is a pneumatic controller connected to said air source.

28. The vehicle of claim 19 wherein:

said valve controller comprises a manual switch having valve opening and closing positions; and said remote control can transmit said valve closing signal when said switch is in said opening position.

29. The vehicle of claim 19 wherein:

said power take-off controller comprises a manual switch having power take-off engaging and disengaging positions; and

said remote control can transmit said power take-off disengaging signal when said switch is in said power take-off engaging position.

30. The vehicle of claim 19 wherein:

said vehicle further comprises a throttle controller for opening a throttle of said engine in response to a throttle opening signal and closing said throttle in response to a throttle closing signal; and

said remote control can transmit said throttle opening and closing signals.

31. The apparatus of claim 30 wherein:

said throttle controller comprises a manual switch having throttle opening and closing positions; and

said remote control can transmit said throttle opening and closing signals when said switch is in said throttle closing position.

32. The vehicle of claim 30 further comprising:

a reel on which said hose may be wound for storage; and a reel motor for winding said hose onto said reel in response to a reel winding signal, unwinding said hose from said reel in response to a reel unwinding signal and stopping said reel in response to a reel stop signal;

wherein, said remote control can transmit said reel winding signal, said reel unwinding signal and said reel stop signal.

33. The vehicle of claim 32 wherein:

said reel motor can only rotate in a winding direction when said transmission disengaging signal is sent to said transmission controller and said throttle closing signal is sent to said throttle controller; and

said reel can only rotate in an unwinding direction when said transmission disengaging signal is sent to said transmission controller and said throttle opening signal is sent to said throttle controller.

34. The vehicle of claim 19 further comprising:

a reel on which said hose may be wound for storage; and a reel motor for winding said hose onto said reel in response to a reel winding signal, unwinding said hose from said reel in response to a reel unwinding signal and stopping said reel in response to a reel stop signal; wherein, said remote control can transmit said reel winding signal, said reel unwinding signal and said reel stop signal.

35. The apparatus of claim 19 wherein said fluid transferring means comprises a pump having a shaft connected to and driven by said power take-off.

36. A method of delivering liquid from a delivery vehicle to a storage vessel, said method comprising the steps of:

- (a) opening a flow valve in communication with a tank of the vehicle so that the tank is placed in communication with a pump on the vehicle;
- (b) disengaging a clutch on the vehicle;
- (c) engaging a power take-off on the vehicle so that power from an engine on the vehicle may be transferred to the pump when the clutch is engaged;
- (d) extending a delivery hose from the vehicle;
- (e) connecting a hose valve on an end of the hose to the storage vessel;
- (f) opening the hose valve;
- (g) remotely engaging the clutch so that power is transferred to the pump and liquid is pumped out of the tank and through the delivery hose into the storage vessel;
- (h) remotely disengaging the clutch when a quantity of liquid in the storage vessel reaches a desired level;
- (i) closing the hose valve;
- (j) disconnecting the delivery hose from the storage vessel; and
- (k) returning the delivery hose to the vehicle.

37. The method of claim 36 further comprising: after step (g), remotely opening a throttle of the vehicle to increase the speed of the power take-off and pump.

38. The method of claim 37 further comprising:

prior to step (h), remotely closing the throttle.

39. The method of claim 36 wherein step (d) comprises:

unwinding the delivery hose from a reel on the vehicle.

40. The method of claim 39 wherein:

the reel is a powered reel; and

step (d) comprises:

remotely actuating the reel to unwind the delivery hose therefrom.

41. The method of claim 40 further comprising:

prior to step (d), remotely opening a throttle of the vehicle to increase the speed of the engine.

42. The method of claim 39 wherein:

the reel is a powered reel; and

step (k) comprises:

remotely actuating the reel to rewind the delivery hose thereon.

43. The method of claim 42 further comprising:  
prior to step (k), remotely closing a throttle of the vehicle  
to decrease the speed of the engine.

44. The method of claim 36 further comprising:  
in an emergency situation, remotely disengaging the power take-off;

45. The method of claim 36 further comprising:  
in an emergency situation, remotely closing the flow valve.

46. The method of claim 36 further comprising:  
in an emergency situation, remotely stopping the engine.

47. The method of claim 36 further comprising, in an emergency, the steps of:  
remotely disengaging the power take-off;  
remotely closing the flow valve; and  
remotely stopping the engine.

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48. A control apparatus for use on a liquid delivery vehicle of the type having a liquid tank, a flow valve in communication with the liquid tank, a pump in communication with the flow valve, a power take-off connected to the pump for providing power thereto, a delivery hose in communication with the pump, and a hose reel on which the hose may be wound for storage, said apparatus comprising:

a hose reel drive means for rotating the hose reel;

a reel motor connected to said hose reel drive means for actuation thereof in response to a signal; and

a remote control for sending said signal to said reel motor.

49. The apparatus of claim 48 wherein:

said signal is a hose unwinding signal; and

said reel motor is adapted for unwinding the hose from the hose reel in response to said hose unwinding signal; and

said remote control is adapted for sending said hose unwinding signal to said reel motor.

50. The apparatus of claim 49 wherein the delivery vehicle is also of the type having a clutch for selectively connecting the power take-off to an engine of the vehicle, said apparatus further comprising:

clutch control means mounted on the vehicle for engaging the clutch in response to a clutch engaging signal and disengaging the clutch in response to a clutch disengaging signal;

wherein, said reel motor will only rotate the reel when said clutch disengaging signal is sent to said clutch control means.

51. The apparatus of claim 50 wherein:

said remote control is adapted for selectively sending said clutch engaging and disengaging signals to said clutch control means.

52. The apparatus of claim 50 wherein:

said clutch control means comprises:

a clutch pneumatic controller connectable to an air source on the vehicle and responsive to said clutch engaging and disengaging signals; and  
a clutch pressure switch in pneumatic communication with said clutch pneumatic controller and connected to said reel motor such that said reel motor will rotate only when said clutch pressure switch senses air pressure communicated to said clutch pneumatic controller.

53. The apparatus of claim 48 further comprising throttle control means for opening an engine throttle of the vehicle in response to a throttle opening signal enclosing the throttle in response to a throttle closing signal.

54. The apparatus of claim 53 wherein:

said reel motor will only rotate the reel in a winding direction when said throttle closing signal is sent to said throttle control means; and

said reel motor will only rotate the reel in an unwinding direction when said throttle opening signal is sent to said throttle control means.

55. The apparatus of claim 53 wherein said remote control means is adapted for transmitting said throttle opening and closing signals.

56. The apparatus of claim 53 wherein:  
said throttle control means comprises:  
a throttle controller; and  
a throttle switch having a throttle opening and closing position.

57. The apparatus of claim 56 wherein:  
said remote control is adapted for transmitting said throttle opening and closing signals to said throttle controller when said throttle switch is in said throttle closing position.

58. The apparatus of claim 48 wherein said remote control is wireless.

59. The apparatus of claim 48 further comprising an emergency shutdown for closing the flow valve and shutting off power to the pump and said hose reel drive means.

60. A control apparatus for use on a liquid delivery vehicle of the type having a liquid tank, a flow valve in communication with the liquid tank, a pump in communication with the flow valve, said apparatus comprising:  
valve control means for closing the valve in response to a valve closing signal;

and

a remote control for sending said valve closing signal to said valve control means.

61. The apparatus of claim 60 wherein:

said valve control means is also adapted for opening the valve in response to a valve opening signal.

62. The apparatus of claim 61 wherein said valve control means comprises a valve pneumatic controller connectable to an air source on the vehicle and responsive to said valve opening and closing signals.

63. The apparatus of claim 62 wherein:

said valve control means further comprises:

a valve pressure switch in pneumatic communication with said valve pneumatic controller; and

a valve indicator light connected to said valve pressure switch such that said valve indicator light is illuminated when said valve pressure switch senses air pressure communicated to said valve pneumatic controller.

64. The apparatus of claim 60 further comprising:

power take-off control means mounted on the vehicle for engaging the power take-off in response to a power take-off engaging signal and disengaging the power take-off in response to a power take-off disengaging signal.

65. The apparatus of claim 64 wherein said remote control is adapted for transmitting said power take-off disengaging signal and said power take-off engaging signal.

66. The apparatus of claim 65 wherein:

said power take-off controller comprises a manual switch having power take-off engaging and disengaging positions; and  
said remote control is adapted for transmitting said power take-off disengaging signal when said switch is in said power take-off engaging position.

67. The apparatus of claim 60 wherein said remote control is wireless.

68. The apparatus of claim 60 further comprising an emergency shutdown for sending said valve closing signal and shutting off power to the pump.

69. The apparatus of claim 60 further comprising:

ignition control means for disengaging an ignition of the engine from a power source on the vehicle in response to an engine shutdown signal; and  
wherein, said remote control is adapted for transmitting said engine shutdown signal to said ignition control means.

70. A control apparatus for use on a liquid delivery vehicle of a type having a liquid tank, a flow valve in communication with the liquid tank, a pump in communication with the flow valve, a power take-off connected to the pump for providing power thereto from the engine and an

engine throttle on the engine, said apparatus comprising:

throttle control means for opening an engine throttle of the vehicle in response to a throttle opening signal and closing the throttle in response to a throttle closing position; and a remote control for transmitting the throttle opening and closing signals.

71. The apparatus of claim 69 wherein said throttle control means comprises a throttle controller connectable to an electrical air source of a vehicle and responsive to the throttle opening and closing signals.

72. The apparatus of claim 70 wherein:

said throttle control means further comprises:

a throttle switch having a throttle opening and closing position;  
wherein, said remote control is adapted for transmitting said throttle opening and closing signals to said throttle controller when said throttle switch is in said throttle closing position.

73. The apparatus of claim 69 further comprising:

clutch control means mounted on the vehicle for engaging a clutch of the vehicle in response to a clutch engaging signal and disengaging the clutch in response to a clutch disengaging signal; and

wherein, said remote control is adapted for sending said clutch engaging and disengaging signals to said clutch control means.

74. The apparatus of claim 72 wherein said clutch control means comprises a clutch pneumatic controller connectable to an air source on the vehicle and responsive to said clutch engaging and disengaging signals.

75. The apparatus of claim 73 wherein:  
said clutch control means further comprises:

a clutch pressure switch in pneumatic communication with said clutch pneumatic controller; and  
a clutch indicator light connected to said clutch pressure switch such that said clutch indicator light is illuminated when said clutch pressure switch senses air pressure applied to said clutch pneumatic controller.

76. The apparatus of claim 69 wherein said remote control is wireless.

77. The apparatus of claim 69 further comprising an emergency shutoff for closing the valve, shutting off power to the pump and closing the throttle.

78. A control apparatus for use on a liquid delivery vehicle of the type having a liquid tank, a flow valve in communication with the liquid tank, a pump in communication with the flow valve, a transmission connected to the engine, a power take-off on the transmission and connected to the pump for providing power thereto, said apparatus comprising:  
valve control means mounted on the vehicle for closing the valve in response to a valve closing signal;

power take-off control means mounted on the vehicle for disengaging the power take-off in response to a power take-off disengaging signal; and  
a remote control for sending said valve closing signal and said power take-off disengaging signal.

79. The apparatus of claim 77 further comprising:

emergency shutdown means for substantially simultaneously shutting off the engine of the vehicle, closing the flow valve and disengaging the power take-off in response to a shutdown signal; and

wherein said remote control is adapted for transmitting said shutdown signal.

80. The apparatus of claim 78 wherein said power shutdown signal comprises an engine stop signal, said valve closing signal and said power take-off disengaging signal.

81. The apparatus of claim 77 wherein:

said transmission is a manual transmission comprising a clutch; and  
further comprising clutch control means mounted on the vehicle for disengaging the clutch in response to a clutch disengaging signal; and  
wherein, said remote control is adapted for sending said clutch disengaging signal.

82. The apparatus of claim 77 wherein:

said transmission is an automatic transmission;

said power take-off control means is characterized by a transmission controller connected to said automatic transmission; and

said power take-off disengaging signal comprises a transmission disengaging signal.

83. The apparatus of claim 81 wherein said transmission controller comprises a solenoid.

84. The apparatus of claim 77 wherein said remote control is wireless.

85. A control apparatus for use on a delivery vehicle of a type having a liquid tank, a flow valve in communication with the liquid tank, a pump in communication with the flow valve, a power take-off connected to the pump and connectable to an engine of the vehicle for providing power to the pump, said apparatus comprising:

an ignition controller for disengaging an ignition of the engine from a power source on the vehicle in response to an engine shutdown signal; and

a remote control for transmitting said engine shutdown signal to said ignition controller.

86. The apparatus of claim 85 further comprising:

a valve controller for closing the flow valve in response to a valve closing signal; and

wherein, said remote control is adapted for transmitting said valve closing signal

to said valve controller.

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